

## **Assessing the Situation of Non-forest Private Woodlands: The Turkish Case**

Kenan Ok

Department of Forest Economics  
Forestry Faculty of Istanbul University  
34473 Bahcekoy, Istanbul, Turkey

Bekir Kayacan

Department of Forest Economics  
Forestry Faculty of Kafkas University  
08000 Artvin, Turkey

This paper examines the situation of private woodlands in Turkey, which are referred to as 'non-forest private woodlands' (NFPWs). The questions addressed by this study are '*Why are NFPWs not defined as forest?*', '*Is the exclusion of NFPWs from forests reasonable?*' and '*What are the consequences of excluding NFPWs from the forest regime?*'. It is found that the criteria used to define a forest in Turkey, and hence to exclude NFPWs from forests, do not have a rational basis. Moreover, the threshold level of area, the most decisive criterion, is far beyond comparable international values and cannot be explained by country peculiarities. Also, NFPWs are more likely to be granted tree cutting approval if they have some type of official cadastre or if they harvest trees for domestic use. Commercial-use NFPWs make tree cuttings in higher quantities than domestic harvesters. NFPWs in general can be perceived as fuelwood harvesters as opposed to industrial wood suppliers. NFPWs with forest or land cadastre tend to harvest at higher levels compared to those without a cadastral survey. In the 8-year period 1993 and 2000, approximately 2.5 M m<sup>3</sup> of wood was harvested on NFPWs across Turkey. The annual wood production on NFPWs throughout the country decreased drastically during that period, from about 700,000 m<sup>3</sup> down to about 150,000 m<sup>3</sup>. This may be an alarming sign for environmental and socio-economic sustainability involving these lands. Forest management of these lands can be improved if the forestry administration authority implements planned environment-related regulative criteria as well as sound channels of communication, designed to lead the landowners towards best 'forest' management practices and hence to guarantee the sustainability of the communities and the natural resource base of the country.

**Keywords:** Forest definition, threshold values, crown cover, cadastre

## INTRODUCTION

Turkey has about 20 M ha of forestland comprising approximately 25% of the total land area of the country. At present, more than 99% of the area defined as forestland is owned by the state. The remaining miniscule portion of the forests is owned by private (non-state) entities. The cadastral status of one quarter of the entire forestland across the country is still pending, due mostly to the insufficient number of cadastral commissions (boundary location teams), frequent changes of legal definition of forest, social and political pressures and insufficient forest protection (The Forestry Council 1994). However, the current ownership pattern is not likely to change markedly even after the accomplishment of cadastral survey of forest areas.

Along with the state-owned and private forestlands, individuals and other private entities own woodlands that fall outside the definition of 'forest'. Although such 'non-forest private woodlands' (NFPWs) are recognised to account collectively for a small proportion of the total forest area, there has been no inventory of their area. In fact, a formal interaction between the forestry administration and NFPW ownerships takes place only when an application is filed by the owner to obtain permission for tree harvesting from the regional forestry administration. However, these woodlands are still important because they are scattered throughout the country, and are of value to a substantial number of households and individuals. Moreover, NFPWs may play a substantial environmental role. Despite the lack of formal surveys, NFPWs in particular regions are observed to be of value in relation to wildlife, biodiversity and soil protection. Additionally, valuable information on natural history of a region may be obtained from the NFPWs that have survived intensive agriculture and urban sprawl.

In Turkey, whether a woodland is defined as a forest is a critical issue with respect to resource sustainability and the environment. If a woodland is legally defined as a forest, the owner is required by law to prepare and apply a forest management plan and there exist particular restrictions as to land use, including a limitation on construction on the land. When not defined as a forest, however, the woodland differs little from any other land parcel in respect of land use, although the owners are required to obtain approval from the local forest administration when they plan to cut trees. By the same token, a need arises to deal with the questions: '*Why are NFPWs not defined as forest?*', '*Is the exclusion of NFPWs from forests reasonable?*' and '*What are the consequences of excluding NFPWs from the forest regime?*'.

In spite of their perceived socio-economic and environmental value to their proprietors and the country, the situation of NFPWs in Turkey has not been assessed formally to date. This study, therefore, is designed to fill the gap of research on NFPWs, including addressing the above questions. In addition to the country-specific findings and discussions, some more universal implications and conclusions are drawn. The next section explains the research method adopted, including information sources and statistical approaches. The results of statistical analyses are then presented. In the last section, findings of the study are summarised and discussed, and conclusions are drawn for the management of NFPWs.

## RESEARCH METHOD

This investigation draws on information from several currently available sources rather than through a new survey on NFPWs in Turkey. Major information sources for addressing the first two of the research questions include FAO (2000), Lund (2002a) and several Turkish legal documents. For addressing the third research question, specific data were provided by the Cadastre and Ownership Department (COD) of the General Directorate of Forests (GDF), a department that collects the relevant records from the Regional Forest Directorates throughout Turkey. Tree harvest data and other information provided by COD pertain to NFPWs in 27 Regional Forest Directorates across the country. However, two of the directorates, namely Eskişehir and Erzurum, were excluded from the analyses to avoid bias due to the very small number of applications for tree harvest on NFPWs during the period analysed.

The COD provided information for the three years 1998 to 2000. The data available on the applications and approvals for tree harvest on NFPW have been categorised by harvest purpose and harvested land's cadastral status. Harvest purposes of the applications are divided into domestic (own) use and commercial use. The cadastral status of the NFPW ownerships that make application for tree cutting are recorded as forest cadastre, land cadastre and no cadastre. The ultimate purposes of the surveys of land cadastre and forest cadastre differ although they are technically similar (Ayanoğlu 1994). Land cadastre aims basically to keep the records of the real estate properties, to settle the property rights and titles, and hence to provide grounds for conveyancing. On the other hand, forest cadastre works are carried out to determine the boundaries and ownerships of the forestland. Forest cadastre teams (commissions) consist of two forest engineers, one agricultural expert and two local representatives. In contrast, teams for land cadastre comprise general surveying and geodesy experts but no forestry or agriculture experts.

In addition to the specific sources of information explained above, practitioners and administrators of the forestry profession were contacted to discuss specific matters concerning NFPWs.

In order to understand why NFPWs are excluded from the forest regime in Turkey, the criteria for categorising land parcels as forest have been investigated, and the past and present approaches to NFPWs with respect to forest definition are reviewed. Since how and why the specific threshold values for forest definition have been determined is not clearly explained in the available official documents, reasonability of exclusion of NFPWs from forests is assessed from an international perspective. The threshold values used as a basis to define a forest in Turkey are compared with those set by the Food and Agriculture Organisation (FAO) of the United Nations and also by selected individual countries. FAO criteria have been chosen for this purpose because this organisation provides the most detailed definitions and threshold values as to woodlands and publishes the most comprehensive forest resource reports worldwide. The countries selected for comparison are those located in the temperate and boreal zones of the northern hemisphere. A total of 25 countries were chosen for which necessary comparative

data were readily available. They include Austria, Belgium<sup>1</sup>, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, United Kingdom, the USA and Japan.

In addition to international comparison of threshold values, it is also investigated whether a country's area threshold, which is the most decisive criterion for defining forestland in Turkey, is attributable to its own peculiarities. Arguably, a country's minimum land size requirement to define a forest can be related to: (1) proportion of forest and other wooded land in the overall country area; (2) forest and other wooded land per capita; (3) proportion of forestland in all wooded lands; and (4) proportion of public (or private) forests in all forestland. Possible relationships of area threshold value with country characteristics of the 25 countries have been investigated through correlation of minimum area requirement with each of the above four country variables as well as through multiple regression analysis to examine whether area threshold value is explained by the four variables.

The third question, of *'What are the consequences of excluding NFPWs from the forest regime?'*, is addressed via two steps. The first step is an assessment of the potential influence of harvest purpose and cadastral status on applications and (dis)approvals for cuttings on NFPWs. A series of  $\chi^2$  tests using the count data on harvest applications and selected ownership characteristics have been applied to test the null hypotheses: (1) *'The likelihood of approval of applications for tree harvest on NFPWs is not associated with the cadastral status of NFPWs'*; (2) *'The likelihood of approval of applications for tree harvest on NFPWs is not associated with the harvest purpose of NFPWs'*; and (3) *'There is no association between harvest purpose and cadastral status of NFPWs in all applications or the approved applications'*.

In the second step, effects of type of harvested wood, harvest purpose and cadastral status upon wood production from NFPWs are examined. For this purpose, two two-way analyses of variance (ANOVAs) have been conducted. The first ANOVA tests the null hypotheses: (1) *'Type of harvested wood does not have a main effect on the level of wood production'*, (2) *'Harvest purpose does not have a main effect on the level of wood production'* and (3) *'There is no interaction of the factors, i.e. of harvested wood type and harvest purpose'*. The null hypotheses tested through the second ANOVA are (1) *'Cadastral status does not have main effect on the level of wood production'*, (2) *'Harvest purpose does not have main effect on the level of wood production'* and (3) *'There is no interaction of the factors, i.e. of cadastral status and harvest purpose'*. For the second ANOVA, it is assumed for each of the 25 regions that the cadastral status proportions of wood production for each harvest purpose group are parallel to those of count data of harvest applications. Such an assumption is needed because the responsible forestry agency (COD) does not provide records of wood production by cadastral status of NFPWs but only by harvest purpose.

---

<sup>1</sup> Belgian threshold values are represented by the averages of the Flemish and Walloon regions.

## RESEARCH RESULTS

### Why NFPWs Are Not Defined as Forests

A parcel of land is usually categorised as forest on the basis of either land use or land cover (Lund 2002b). Even though these two bases are often used interchangeably, their meanings differ greatly. Land cover is the ecological state and physical appearance of the land surface (e.g. closed forest, open forest or grasslands), whereas land use is the purpose to which land is put by humans (e.g. protected areas, forestry for timber products, plantations, row-crop agriculture, pastures, human settlements). There often are specific threshold values required for a piece of land to be defined as forest regardless of whether the basis of definition is land use or land cover. The threshold values that are especially important for identifying land classes include minimum area (hectares), canopy or crown cover, tree height, and strip width (Lund 2002b). As a matter of fact, 42 countries use area threshold value while 69 have a threshold value for crown cover, 43 for tree height and 23 for strip width (Lund 2002a). Conceivably, more than one of these threshold values may be applied together.

In Turkey, as in most countries, use of forestland is subject to regulations at various levels. The first comprehensive example of such regulations in Turkey was *The Forest Act* (No. 3116) enacted in 1937. This Act provided the first definition of a 'forest' and set out specifications of land to be categorised as a forestland. Use of forestland, whether public or private, was subjected to various permissions and plans, which can reasonably be interpreted as the instruments to contribute to the sustainability of forest resources. On the other hand, the use of 'non-forest' woodlands appeared to be far from adequately dealt with in the Act. Woodlands which were 'not contiguous to forests' and were less than 5 ha in area were not legally categorised as forests (Kızılay 1988, p. 457). This implied that the owners of woodland that was 4.9 ha or smaller and 'distant' from main forestlands were free to put their land to non-forestry uses with practically no concern about resource sustainability. The situation was somewhat changed with the enactment in 1950 of *The Forest Act* (No. 5653): Woodlands smaller than 3 ha and 3 km or more distant from existing legal forest boundaries remained outside the definition of forest (Kızılay 1988).

Though several related statutes exist, the current principal statute concerning forestry in Turkey is *The Forest Act* (No. 6831) enacted in 1956, which has undergone a number of amendments to date. This legislation prescribes that 'non-state' woodlands, which are not contiguous to the state forests and do not exceed 3 ha in size are *not* legally regarded as forest; however, as practiced by the forest cadastre commissions, the area threshold for the 'state' woodlands with the same characteristics is only 0.33 ha. Two other criteria are imposed as minimum threshold values in the forest definition, namely 10% for crown cover and 8 m for tree height. These are defined in the lower-level regulations rather than in *The Forest Act*. No strip width is prescribed in any level of the present regulations.

As established by the current forest Act, land use forms the basis for definition of a forest. In effect, a piece of land is *not* classified as forest, even though it contains a substantial amount of tree or scrub cover in clusters or in strips or in scattered form, if, for example, the land is private agricultural land, ancient cemetery or private non-native-species woodland. Additionally, *The Forest Act* excludes land with *valonia*

oak (*Quercus ithaburensis* var. *macrolepis*) and umbrella pine (*Pinus pinea*) from being forest, considering these as 'fruit' trees. A debate has been continuing about whether groves of alder and chestnut should also be excluded from the legal forest definition.

#### Reasonableness of Excluding NFPWs from Forests

Table 1 contains the summary information on FAO criteria for definition of forests and other wooded land. The Turkish threshold value for crown cover is precisely the same as that of FAO, while the minimum height of tree definition is somewhat higher. A major difference arises in minimum threshold area size: the FAO value of 0.5 ha is only one sixth of that (3 ha) used in Turkey. FAO prescribes 20 m as the minimum strip width, for which no Turkish counterpart is currently specified.

**Table 1.** FAO criteria and threshold values for definition of forest and other wooded lands

Land type	Vegetation type	Crown cover	Area
Forest	Trees with a minimum height of 5 m at maturity	More than 10% of area	More than 0.5 ha. (Windbreaks and shelterbelts should also have a width more than 20m)
Other woodland (OWL)	Either trees with a minimum height of 5m at maturity or trees not able to reach a height of 5 m at maturity (e.g. dwarf stunted trees) and shrub and bush cover	Either between 5-10% of area or more than 10% of area	More than 0.5 ha

As indicated in Table 2, all of the 25 other countries in this comparison use land size as a criterion for determining whether a woodland is a forest. On the other hand, 16 countries use the crown cover threshold, 15 countries the strip width threshold, and 10 countries the tree height threshold (Lund 2002a).

**Table 2.** Countries by type of threshold value for forest definition

Countries with <i>crown cover</i> threshold values	Countries with <i>strip width</i> threshold values	Countries with <i>tree height</i> threshold values
Austria, Belgium, Denmark, Estonia, France, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom, USA and Japan	Austria, Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, United Kingdom and USA	Belgium (Walloon Region only), Bulgaria, Denmark, Estonia, France, Luxembourg, Netherlands, Romania, USA and Japan

In Table 3, the Turkish threshold values are compared with the descriptive group statistics of the 25 countries. The Turkish value for crown cover (10%) is consistent

with those in the countries compared, since the crown cover values range between 5% and 30% and six of the 25 countries stipulate a crown cover threshold value equal to or less than 10%. The tree height value in Turkey seems somewhat above the range of the compared values. Notably, the threshold value of area specified to define a private (non-state) forest in Turkey exceeds drastically the range of the values of the other countries. The Turkish area threshold is six times as large as the highest of the compared values.

**Table 3.** Comparison of Turkish threshold values for definition of non-state forests with the values in other countries

Type of threshold value	Turkish value	Descriptive group statistics of the countries compared					
		Mean value	Standard deviation	Median value	Lowest value	Highest value	Number of countries
Area (ha)	3	0.25	0.17	0.25	0.01	0.50	25
Crown cover (%)	10	18.75	9.04	20	5	30	16
Strip width (m)	None	20.87	9.27	20	10	40	15
Tree height (m)	5-8	4.73	1.63	5	1.30	7	10

A correlation analysis of threshold area and country characteristics found no significant correlation between minimum area requirement and each of the four country variables (percentage of forest and other wooded land in total land area, forest and other wooded land per capita, proportion of forest land in all wooded lands and proportion of public forests in all forestland). Furthermore, a multiple regression analysis failed to provide evidence that the country area thresholds are related to the above four thresholds variables of Table 3 ( $R^2 = 0.055$ ; F value = 0.29)<sup>2</sup>.

### The Consequences of Excluding NFPWs from the Forest Definition

#### *Applications and approvals for tree harvest on NFPWs*

Over the period between 1998 and 2000, 31,907 applications were made for tree harvest by NFPW owners to the regional forestry administrations throughout Turkey, 27,180 (about 85%) of which were approved. The applications were distributed more or less uniformly over the three years, and the rates of approval were relatively constant between years (Table 4).

Results of  $\chi^2$  tests of association between cadastral status and approval rate are presented in Table 5. The significant  $\chi^2$  value indicates that the likelihood of approval of an application for tree harvest is strongly associated with *cadastral status* of the NFPW. In other words, NFPW owners who apply to cut trees are less likely to be permitted to cut if their woodland has not been subjected to some type of cadastral survey at the time of their application to the regional forest administration. Type of cadastre does not seem to be critical in this matter, since the proportions of applications approved are similar under forest cadastre and land cadastre.

<sup>2</sup> The estimated regression equation is  $\text{Area Threshold Value} = 0.348 - 0.00102 A + 0.0156 B - 0.00144 C + 0.00104 D$ , where A to D represent the four criteria variables of Table 3.

**Table 4.** Number of all and approved applications for tree cutting, 1998 to 2000

Variable	Year			
	1998	1999	2000	Cumulative (1998-2000)
Number of applications	10,241	11,073	10,593	31,907
Number of applications approved	8,773	9,396	9,011	27,180
Approval rate (%)	85.7	84.9	85.1	85.2

Results of  $\chi^2$  tests of association between cadastral status and approval rate are presented in Table 5. The significant  $\chi^2$  value indicates that the likelihood of approval of an application for tree harvest is strongly associated with *cadastral status* of the NFPW. In other words, NFPW owners who apply to cut trees are less likely to be permitted to cut if their woodland has not been subjected to some type of cadastral survey at the time of their application to the regional forest administration. Type of cadastre does not seem to be critical in this matter, since the differences between expected and observed counts of approvals seem to be proportionally similar for NFPWs with land cadastre and NFPWs with forest cadastre.

**Table 5.** Contingency table for cadastral status and approvals

Cadastral status	Approved <sup>a</sup>	Disapproved <sup>a</sup>	Total
With forest cadastre	15,993 (15,673)	2,406 (2,725)	18,399
With land cadastre	7,530 (7,312)	1,054 (1,271)	8,584
With no cadastre	3,657 (4,194)	1,267 (729)	4,924
Total	27,180	4,727	31,907

a. Numbers in parentheses are expected frequencies.

$\chi^2$  calculated value = 552.739,  $\chi^2$  table value = 13.82 for 2 df and  $\alpha = 0.001$

Table 6 reports  $\chi^2$  statistics and count data for *harvest purpose* and approvals and disapprovals of tree harvest applications. The significant association between harvest purpose and approval rate indicates that NFPW harvest applications for domestic use are more likely to be approved by the regional forestry administration than those applications for commercial purpose.



**Table 6.** Contingency table for harvest purpose and harvest approvals and disapprovals

Harvest purpose	Approved <sup>a</sup>	Disapproved <sup>a</sup>	Total
Domestic use	17,147 (17,063)	2,884 (2,967)	20,031
Commercial use	10,033 (10,116)	1,843 (1,759)	11,876
Total	27,180	4,727	31,907

a. Numbers in parentheses are expected frequencies.

$\chi^2$  calculated value = 7.424,  $\chi^2$  table value = 6.635 for 1 df and  $\alpha = 0.01$

In Table 7,  $\chi^2$  tests on the association between harvest purpose and cadastral status of NFPWs are reported. Immediate observations on the count data for all applications and approved applications are that the number of the applications for domestic use is greater than that for commercial use, and that most of the applications are made by the ownerships with some cadastre, particularly forest cadastre. The  $\chi^2$  tests reveal a strong association between harvest purpose and cadastral status of NFPWs in both groups. NFPW ownerships in both groups that plan to make cuttings are more likely to have had some type of cadastral survey on their land if they are to cut trees for commercial purposes. NFPWs with no cadastre are more likely to be harvested for domestic or own use. Notably, woodlands with forest cadastre have somewhat larger differences between expected and actual counts than those with lands with land cadastre.

**Table 7.** Contingency tables of all and approved applications for harvest purpose and cadastral status

Cadastral status	All applications			Approved applications		
	Domestic use	Commercial use	Total	Domestic use	Commercial use	Total
With forest cadastre	10,819 (11,550)	7,580 (6,848)	18,399	9,547 (10,089)	6,446 (5,903)	15,993
With land cadastre	5,324 (5,388)	3,260 (3,195)	8,584	4,719 (4,750)	2,811 (2,779)	7,530
With no cadastre	3,888 (3,091)	1,036 (1,832)	4,924	2,881 (2,307)	776 (1,349)	3,657
Total	20,031	11,876	31,907	17,147	10,033	27,180
For all applications: $\chi^2$ calculated value = 678.380, $\chi^2$ table value = 13.82 for 2 df and $\alpha = 0.001$ .			For approved applications: $\chi^2$ calculated value = 466.346, $\chi^2$ table value = 13.82 for 2 df and $\alpha = 0.001$ .			

a. Numbers in parentheses are expected frequencies.

*Wood production on NFPWs*

According to records kept by COD, the responsible department of the Ministry of Environment and Forestry, in the 8-year period between 1993 and 2000 approximately 2.5 M m<sup>3</sup> of wood was harvested on NFPWs across the country, averaging more than 300,000 m<sup>3</sup> per annum. The annual wood production on NFPWs throughout the country has been decreasing drastically during that period, from about 700,000 m<sup>3</sup> down to about 150,000 m<sup>3</sup>.

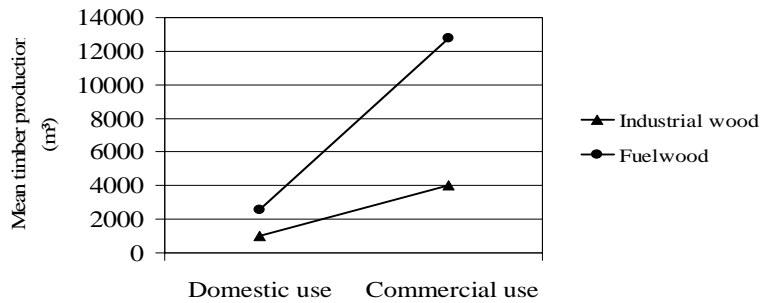
A total of 508,587 m<sup>3</sup> of wood was harvested on NFPWs during the analysis period between 1998 and 2000, about 82% of which was for commercial or sales purposes, the balance being for domestic or own use. Only about 25% of the entire NFPW wood production is accounted for by industrial wood, the balance being fuelwood.

A plot of mean amounts of wood production between 1998 and 2000 per regional forest directorate<sup>3</sup> by harvest purpose for industrial wood and fuelwood, is provided in Figure 1. Production of fuelwood exceeds that of industrial wood for either harvest purpose, and commercial harvest is greater than harvest for domestic use for both harvested wood types. This situation indicates the 'main effects' of the two factors, namely type of wood harvested and harvest purpose. The difference between the mean productions of industrial wood and fuelwood in the case of commercial use is notably larger than the difference in the case of domestic use. That is, the two lines in Figure 1 are not parallel – interaction exists between the two factors.

The main effects and interaction, illustrated in Figure 1, are formally tested for statistical significance by a two-way ANOVA based on 100 observations (wood production levels for four harvest groups within each of 25 directorates). As indicated in Table 8, type of wood harvested has a statistically significant effect on NFPW wood production, indicating a tendency of NFPWs towards production of fuelwood rather than industrial wood. Also, harvest purpose is found to be related to wood production level of NFPWs, that is, NFPWs are inclined to produce a larger commercial harvest than harvest for domestic use. Lastly, there is a significant interaction between type of wood harvested and harvest purpose; the mean difference between industrial wood and fuelwood production for commercial purposes is greater than the mean difference for domestic use.

---

<sup>3</sup> For example, industrial wood production for domestic use purpose per regional directorate was 990.77 m<sup>3</sup> in the three-year period. Therefore,  $990.77 \times 25 = 24,769.25$  m<sup>3</sup> of domestically-harvested industrial wood is produced in NFPWs within all 25 directorates, hence throughout the country.

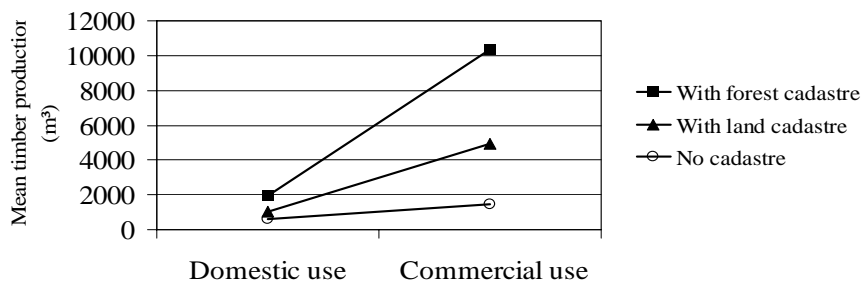


**Figure 1.** Plot of mean amounts of wood production by harvest purpose and harvested wood type

**Table 8.** Two-way ANOVA for the effects of harvested wood type and harvest purpose upon wood production level of NFPWs

Source of variation	df	Calculated F value	Critical F value
Type of wood harvested	1	8.68	6.91 (1% level)
Harvest purpose	1	14.06	11.52 (0.1% level)
Interaction	1	4.15	3.94 (0.5% level)
Error	96		
Total	99		

The mean amounts of NFPW wood production between 1998 and 2000 by harvest purpose and cadastre status per regional forest directorate are plotted in Figure 2. For both domestic and commercial use, a greater quantity is harvested from NFPWs with some cadastre than those with no cadastre. Also, NFPW owners appear to undertake commercial cuttings to a greater extent than those for domestic use whether they have forest cadastre, land cadastre or no cadastre. As well as these main effects of the factors of cadastral status and harvest purpose, an interaction of the factors is observed in Figure 2 where the three lines are not parallel.



**Figure 2.** Mean amounts of wood production by harvest purpose and cadastral status

The wood production data have been subjected to a two-way ANOVA. As reported in Table 9, the cadastral status, harvest purpose and interaction effects are all statistically significant. It may be concluded that the wood production level of NFPWs is related to cadastral status and harvest purpose. NFPW owners with either form of cadastre (particularly forest cadastre) harvest a greater amount of wood than those without cadastre, and more wood is harvested for commercial purpose than for domestic use. The mean differences among wood production levels from NFPWs with 'forest cadastre', 'land cadastre' and 'no cadastre' for commercial purposes are greater for cadastred (particularly forest cadastred) NFPWs than those for domestic use.

**Table 9.** Two-way analysis of variance for effect of cadastral status, harvest purpose and interaction upon wood production level of NFPWs

Source of variation	df	Calculated F value	Critical F value
Cadastral status	2	7.34	7.30 (0.1% level)
Harvest purpose	1	15.98	11.35 (0.1% level)
Interaction	2	4.02	3.80 (2.5% level)
Error	144		
Total	149		

## SUMMARY AND CONCLUSION

Non-forest private woodlands in Turkey are not classified as forest, inasmuch as the NFPWs do not meet the criteria used to define a forest. The criteria have been subject to several changes since the enactment of the first *Forest Act* in 1937. Nevertheless, there is little evidence that the main motive behind these changes were to guarantee resource sustainability. In this context, it is difficult to justify the exclusion of some land with 'forest trees' (such as valonia oak, umbrella pine, alder and chestnut) from the forest class. The exclusion has long been an instrument to gain political popularity, because the woodland owners become more free to use their lots, and the land classification has been a controversial issue of debate in Turkey.

The criteria for definition of a forest, and thus of NFPW, comprise legally-set minimum threshold values for land characteristics, namely area (forest size), crown cover and tree height. Determination of the threshold values that can secure sustainability is admittedly difficult. However, the Turkish threshold values cannot be said to be the result of a scientific inquiry. Therefore, the reasonableness of these values has been assessed by international comparison. The current threshold value for crown cover in Turkey conforms to values set by FAO and adopted in comparable countries. Although the tree height value in Turkey is somewhat higher than international values, the difference is not great. Additionally, in Turkey the term '*ağaç*' meaning 'a tree' usually goes together with the term '*ağaçlık*' meaning 'scrub' or 'shrub' when it comes to classify a parcel of land. Hence, the situation of

tree height threshold value is not a primary concern for Turkey, nor is the absence of a threshold value of strip width in Turkey.

The Turkish area threshold of 3 ha, which is the most decisive criterion for forest and NFPW definition, cannot be deemed reasonable from an international perspective. Moreover, this excessive Turkish area value is not explained by the country's peculiarities.

The exclusion of NFPWs from forests bears notable consequences in Turkey. The forest administration is markedly prone to grant cutting permission to those NFPW ownerships with a legally-settled cadastral status, whether forest cadastre or land cadastre. Furthermore, the NFPW owners who apply for tree cutting for domestic use rather than commercial use appear to be more likely to gain approval from the forestry administration. Yet the forestry administration seems to place higher priority on harvest purpose than on cadastral status of the ownerships since domestic harvests are more likely to obtain permission even though they tend to have a settled cadastral status less frequently than commercial harvests.

Commercial-use NFPW ownerships typically harvest greater quantities of wood than domestic harvesters. NFPWs, in general, can also be perceived as fuelwood producers as opposed to industrial wood suppliers. NFPW ownerships with forest or land cadastre tend to harvest at higher levels than those without any previous cadastral survey. This should not be surprising since NFPWs for commercial harvest are more likely to have settled cadastral status and greatest harvest quantities.

The picture of NFPWs in Turkey can arguably be interpreted such that they are perceived by their proprietors as 'wood depots' that are 'running out'. Indeed, this can be an alarming sign for environmental and socio-economic sustainability involving these lands. In view of the above facts, it is highly desirable to re-evaluate the status and management of NFPWs.

One immediate suggestion is to reduce the area threshold value to some more internationally comparable size. Such a change will surely bear significant consequences since most NFPW ownerships will have to assume new responsibilities, because they will become 'forest' ownerships. They will most likely be more constrained as to using their land, which might displease most owners. Thus if such a change is to be imposed, there will inevitably be a need for a new perspective of public relations and extension by the government.

Another option may be to retain the 3 ha area threshold, but to institute environment-related criteria that can be applied in the management of NFPWs. This could be especially critical because there is virtually no regulation concerning the environmental aspects of the management of NFPWs in Turkey. Appropriate criteria might include, but not be limited to, the land's sensitivity to clear-cutting, distance from a 'legal' forest or protected area, existence of other NFPWs nearby, and presence of any wildlife or other biodiversity elements linked to the land. The mode of evaluating the NFPWs by such criteria would require further deliberation. For instance, it may turn out that the more distant a NFPW is from a 'legal' forest or protected area, the more valuable it is ecologically and socio-economically.

Concerning the threshold values other than that of land area, there are obvious pitfalls of strict application of threshold values for 'trees' and 'crown cover' in defining a forest, whether nationally or internationally. As a complex ecosystem, a forest area should by no means be expected to comprise solely trees as dominant vegetation cover throughout. Depending upon the scale, forest ecosystems could

incorporate, to a reasonable extent, parts with shrubs and bushes as well as open spaces. By the same token, when deciding whether a parcel, or a series of parcels, of woodlands is to be defined as forest, the woodland will usually need to be evaluated as a component of the surrounding systems or circumstances rather than as an isolated track. This point is especially crucial with respect to environmental consequences such as impacts on wildlife and biodiversity. In this respect, national and international criteria for forest definition, particularly those set by FAO are open to argument.

Finally, it needs to be emphasised that the forestry administration has a responsibility to set and implement environment-related regulations concerning the management of NFPWs as well as sound channels of communication, monitoring and research, in order to lead the landowners towards best-practice 'forest' management and hence guarantee the sustainability of the communities and the natural resource base of the country.

## REFERENCES

- Ayanoğlu, S. (1994), 'Türk Hukukunda Orman Kadastro'su' (Forest Cadastre in Turkish Law), *Review of the Faculty of Forestry*, Istanbul University, Series B, 44(1-2): 63-82.
- FAO (2000), *Temperate and Boreal Forest Resources Assessment (TBFRA-2000)*, United Nations publication, New York and Geneva, pp. 445.
- Kızılay E. (1988), *Yeni Orman Kanunu* (The New Forest Law), Gelişim Matbaası, Ankara.
- Lund, H.G. (2002a), Definitions of forest, deforestation, afforestation, and reforestation, Forest Information Services, Gainesville, VA, <http://home.att.net/~gklund/DEFpaper.htm>, accessed 4 August 2004.
- Lund, H.G. (2002b), 'When is a forest not a forest?', *Journal of Forestry*, 100(8): 21-28.
- The Forestry Council (1994), *The Volume of Decisions of the First Forestry Council*, The Turkish Ministry of Forestry, Ankara.